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EXAMINER	
SEALEY, LANCE W	
ART UNIT	**PAPER NUMBER**
2671	

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/833,268	LITKE ET AL.	
	Examiner	Art Unit	
	Lance W. Sealey	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2004* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-8,10-32,34 and 36-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-5,7,8,10-14,16-32,34 and 36-40* is/are rejected.

7)☒ Claim(s) *6 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Objection

1. Claim 36 reads, "A system comprising medium means for tangibly embodying...the methods (sic) of claims (sic) 33...". However, claim 36/33 is cancelled.

Allowed and Allowable Subject Matter

2. Claims 6 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art anticipates or suggests, in a method of subdividing a first mesh representation of an object surface bounded by one or more boundary curves to form a second subdivided mesh representation, determining the location of a corner vertex in the second mesh representation by setting it to the location of the corner vertex in the first mesh representation (claim 6) and determining a parameter of a corner vertex on a boundary curve by setting it to the parameter corresponding to the corner vertex in the first mesh representation (claim 15).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention

was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2-5, 7-8, 10-21, 23-27, 34 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli et al. ("Pulli," U.S. Pat. No. 6,078,331) in view of Sargent et al. (U.S. Pat. No. 6,271,861).

5. Pulli, in disclosing a method and system for efficiently drawing subdivision surfaces for 3D graphics, also discloses, with respect to claims 2 and 34, a method of subdividing a first mesh representation of an object surface bounded by one or more boundary curves to form a second subdivided mesh representation, the first mesh representation comprising a plurality of tessellated polygons, each of the polygons having one or more vertices, the method comprising:

- subdividing one or more of the polygons into child polygons, each of the child polygons having one or more vertices (col.6, ll.41-52);
- determining locations of the vertices of the child polygons (col.6, ll.41-52); and
- associating detail vectors with one or more corresponding vertices of the child polygons (connectivity information, col.9, ll.43-45. Vertices of polygons are connected by edges which constitute vectors with detail as to which vertices they connect).

6. However, Pulli does not disclose maintaining boundary vertices of the child polygons on one or more of the boundary curves. These elements are disclosed by the Sargent method of shading at col.5, ll.52-55. (The N by M patch is a child polygon of the parent single patch mesh; see ll.45-47).

7. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli method with the Sargent method by incorporating the application program from Sargent that accomplishes step **306** in FIG.3 of Sargent into the Pulli graphics subsystem **211** (FIG.14). Such a combination would help to define color regions across a gradient (Sargent, col.5, ll.20-27).

8. Note: Since the "subdividing one or more of the polygons into child polygons...", "determining locations of the vertices of the child polygons", and "maintaining boundary vertices of the child polygons..." claim limitations are repeated for several claims, only the rejections for the non-underlined limitations in claims 4-5, 7 and 34 will be explained.

9. Concerning claim 3, Pulli discloses adjusting the locations of one or more vertices of child polygons using the detail vectors at col.13, ll.3-11: "splitting the horizontal edges" (edges are detail vectors because edges of a polygon have magnitude—length—and direction—going from one vertex to another) and "updating the vertex coordinates".

10. Regarding claim 4, Pulli discloses subdividing the second mesh representation one or more times until any error between it and the object surface is less than a prescribed tolerance value (Meshes are typically created from object surfaces to save memory. The more tessellation that occurs, the more realistic the image will be (see col.1, ll.63-67), but more memory will be used. Theoretically, tessellation could occur until the limit is reached (col.7, ll.30-32), but storing a limit surface would be like storing the object itself, and no memory would be saved.

Therefore, in order to trade off memory savings for errors humans perceive in an image, Pulli stops tessellation when it is believed that humans no longer perceive aliasing (applicants' "error") in the surface (applicants' "prescribed tolerance value")).

11. With respect to claim 5, Pulli discloses determining locations of the vertices of the child polygons, including determining the location of an interior vertex in the second mesh representation by weighting the locations of adjacent vertices in the first mesh representation, and adding the weighted locations, at col.8, ll.43-53.

12. Concerning claim 7, Sargent discloses determining the location of the vertices of a child polygon, including determining the location of a boundary vertex in the second mesh representation by determining one or more parameters of a boundary curve corresponding to adjacent vertices in the first mesh representation, weighting the one or more parameters, and adding the weighted parameters to determine a parameter for the boundary vertex in FIG.8A and at col.8, ll.15-17. The location of the boundary vertex that is determined is **124-1**. The parameter of the boundary curve that is determined (**122-1**, FIG.8A) is its location (col.8, ll.15-17). **122-1, 122-2** and **122-3** represent "the second mesh representation". The "adjacent vertices in the first mesh representation" are the vertex at the intersection of **117-4** and **117-1** and the vertex at the intersection of **120-4** and **117-1**. "Weighing the one or more parameters" is disclosed at col.8, ll.15-17 (the locations of **117-4** and **120-4** are weighed/added/averaged to interpolate the location of **122-1/122-2/122-3**).

13. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli method with the Sargent method by incorporating the application program from Sargent that accomplishes step **612** in FIG.7 of Sargent into the Pulli graphics subsystem **211** (FIG.14). Such a combination would result in a more graphically pleasing gradient (Sargent, col.7, ll.25-28).

14. Claim 8 states "determining the location of the boundary vertex from the parameter of the boundary vertex". But from the rejection of claim 7, the "parameter of the boundary vertex" is the location of the boundary vertex, which is disclosed by Sargent.

15. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli method with the Sargent method by incorporating the application program from Sargent that accomplishes step **612** in FIG.7 of Sargent into the Pulli graphics subsystem **211** (FIG.14). Such a combination would result in a more graphically pleasing gradient (Sargent, col.7, ll.25-28).

16. With respect to claims 10-12, since Pulli discloses determining locations of all the vertices of the child polygons, including determining the location of an interior vertex in the second mesh representation by weighting the locations of adjacent vertices in the first mesh representation, and adding the weighted locations, at col.8, ll.41-53, it discloses determining the interior even vertex (claim 10), interior odd vertex (claim 11), and the interior vertex adjacent to a corner vertex (claim 12).

17. Concerning claim 16, Pulli discloses propagating detail vectors in the first mesh representation to vertices in the second mesh representation at col.6, ll.41-52 (subdivision of polygons will result in more detail vectors (polygon edges) connected to more vertices in all subsequent mesh representations after the first mesh representation).

18. Regarding claim 17, Sargent discloses importing detail vectors from another source at col.7, ll.25-32 (editing a mesh, etc. comprise examples of importing detail vectors—lines in a mesh—from another source: the user).

19. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli method with the Sargent method by incorporating the application program from Sargent that accomplishes step **612** in FIG.7 of Sargent into the Pulli graphics subsystem **211** (FIG.14). Such a combination would result in a more graphically pleasing gradient (Sargent, col.7, ll.25-28).

20. With respect to claim 18/2, the mesh resulting from subdividing the mesh mentioned at col.6, l.46 of Pulli is the representation of the object surface. Concerning claim 18/3, the mesh created as a result of executing arrow **905** (FIG.9) in Pulli is the representation of the object surface. Regarding claim 18/4, the surface created when the polygons are small enough to eliminate perceptible geometric aliasing is the representation of the object surface (Pulli, col.7, ll.37-39).

21. Concerning claims 19/2,3,4 and 20/2,3,4, Pulli discloses memory/processor readable medium in read only memory **206**, FIG.14.

22. Regarding claim 21, Pulli discloses a mesh representation comprising a mesh of polygons, the mesh representation having a limit surface, at col.7, l.33. Incorporated in the Pulli mesh representation are Sargent boundary vertices located on one or more boundary curves at col.8, ll.15-17. Pulli also discloses detail vectors corresponding to one or more polygon vertices at col.6, ll.41-52. Convergence to limit points on the limit surface and the existence of detail vectors in the limit surface are disclosed by Pulli at col.7, ll.27-32 (the vertices which make up the limit surface are limit points, and the edges that connect to these vertices are detail vectors). These vertices and detail vectors that comprise the limit surface relate to the shape of the limit surface near the limit point corresponding to the vertex because the limit surface corresponds to the actual shape of the surface, and the configuration of the vertices and detail vectors of the limit surface determine the surface's shape.

23. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli method with the Sargent method by incorporating the application program from Sargent that accomplishes step **306** in FIG.3 of Sargent into the Pulli graphics subsystem **211** (FIG.14). Such a combination would help to define color regions across a gradient (Sargent, col.5, ll.20-27).

24. With respect to claim 23, the mesh representation of claim 21 is disclosed by Pulli as a mesh of subdivided or repeatedly subdivided polygons at col.7, ll.27-32.

25. Concerning claims 24 and 25, Pulli discloses a memory (claim 24) and a processor readable medium (claim 25) tangibly embodying the surface representation of claim 21 in mass storage device **207** (FIG.14).

26. Regarding claims 26/2,3,4, Pulli discloses a system comprising the processor readable medium of claim 20 in FIG.14, and a processor configured to perform the methods of claims 2, 3 and 4 tangibly employed by the processor readable medium (processor **202**, FIG.14).

27. With respect to claim 27, Pulli discloses a system comprising the processor readable medium of claim 25 (mass storage device **207**) and a processor configured to access the surface representation tangibly embodied by the processor readable medium (processor **202**).

28. Concerning claim 36/34, Pulli discloses a system comprising medium means for tangibly embodying the method of claim 34 (mass storage device **207**) and a processor means for performing any of the methods tangibly embodied by the medium means (processor **202**).

29. Regarding claim 37, Pulli discloses a system (FIG.14) comprising a representation of an object surface comprising mesh representation means for representing the object surface with a mesh of polygons (display **221**, FIG.14 is the "mesh representation means" and the object surface represented by a mesh of polygons is shown and FIG.3A and col.6, ll.65-67) and detail vector means for representing the shape of a limit surface corresponding to the mesh representation

means (col.7, ll.27-32--the vertices which make up the limit surface are limit points, and the edges that connect to these vertices are detail vectors), medium means for tangibly embodying the representation (mass storage device **207**); and processor means (processor **202**) for accessing the representation tangibly embodied by the medium means.

30. Accordingly, in view of the foregoing, claims 2-8, 10-21, 23-27, 34 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent.

31. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent and further in view of Ryan et al ("Ryan," U.S. Pat. No. 6,580,428).

32. Regarding claims 28/2,3,4, neither Pulli nor Sargent disclose the system of claim 26 further comprising a CAD device for providing to the processor the first mesh representation or data from which this first mesh representation is derived. However, this CAD device is disclosed by the Ryan method and system for identifying peripheral elements of a complex model in secondary storage-CAD/CAM **26**, FIG.1.

33. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent method with the Ryan CAD/CAM system by incorporating the Ryan CAD/CAM system into the Pulli mass storage device **207** (FIG.14). Such a combination would save computation time because such a CAD/CAM system would enable a user to manipulate data corresponding only to the outer surfaces (Ryan, col.1, ll.42-47).

34. With respect to claim 29, neither Pulli nor Sargent disclose the system of claim 27 further comprising a CAM device for providing to the processor the first mesh representation or data from which this first mesh representation is derived. However, this CAM device is disclosed by the Ryan method and system for identifying peripheral elements of a complex model in secondary storage-CAD/CAM **26**, FIG.1.

35. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent method with the Ryan CAD/CAM system by incorporating the Ryan CAD/CAM system into the Pulli mass storage device **207** (FIG.14). Such a combination would save computation time because such a CAD/CAM system would enable a user to manipulate data corresponding only to the outer surfaces (Ryan, col.1, ll.42-47).

36. Accordingly, in view of the foregoing, claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent and further in view of Ryan.

37. Claims 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent and Ryan and further in view of Stallings et al., Business Data Communications (Third Edition) ("Stallings").

38. Concerning claim 30, neither, Pulli, Sargent nor Ryan disclose a client/server system in which either the client or the server system comprise the system of claim 27. However, a client/server system is disclosed by the Stallings textbook at FIGURE 14.1 on p.411.

39. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent-Ryan system with the Stallings client/server system by distributing the Pulli-Sargent-Ryan system among the Stallings clients and servers. Such a combination would enable more useful work to be done simultaneously (Stallings, TABLE 14-2, fourth item, p.410).

40. Regarding claim 31, neither, Pulli, Sargent nor Ryan disclose a client/server system in which either the client or the server system include the processor readable medium of claim 25. However, a client/server system is disclosed by the Stallings textbook at FIGURE 14.1 on p.411.

41. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent-Ryan system with the Stallings client/server system by distributing the Pulli-Sargent-Ryan system among the Stallings clients and servers, specifically placing the processor readable medium of claim 25 on a server. Such a combination would enable more useful work to be done simultaneously (Stallings, TABLE 14-2, fourth item, p.410).

42. With respect to claim 32, neither, Pulli, Sargent nor Ryan disclose a client/server system in which either the client or the server system include the memory of claim 24. However, a client/server system is disclosed by the Stallings textbook at FIGURE 14.1 on p.411.

43. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent-Ryan system with the Stallings client/server

system by distributing the Pulli-Sargent-Ryan system among the Stallings clients and servers, specifically placing the memory of claim 24 on a server. Such a combination would enable more useful work to be done simultaneously (Stallings, TABLE 14-2, fourth item, p.410).

44. Accordingly, in view of the foregoing, claims 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent and Ryan and further in view of Stallings.

45. Claims 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent and further in view of Stallings.

46. Concerning claims 38/2,3,4, neither, Pulli or Sargent disclose a client/server system in which either the client or the server system comprise the system of claim 26. However, a client/server system is disclosed by the Stallings textbook at FIGURE 14.1 on p.411.

47. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent system with the Stallings client/server system by distributing the Pulli-Sargent system among the Stallings clients and servers. Such a combination would enable more useful work to be done simultaneously (Stallings, TABLE 14-2, fourth item, p.410).

48. Regarding claims 39/2,3,4, neither, Pulli nor Sargent disclose a client/server system in which either the client or the server system include the processor readable medium of claim 20. However, a client/server system is disclosed by the Stallings textbook at FIGURE 14.1 on p.411.

49. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent system with the Stallings client/server system by distributing the Pulli-Sargent system among the Stallings clients and servers, specifically placing the processor readable medium of claim 20 on a server. Such a combination would enable more useful work to be done simultaneously (Stallings, TABLE 14-2, fourth item, p.410).

50. With respect to claims 40/2,3,4, neither, Pulli, Sargent nor Ryan disclose a client/server system in which either the client or the server system include the memory of claim 19. However, a client/server system is disclosed by the Stallings textbook at FIGURE 14.1 on p.411.

51. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Pulli-Sargent system with the Stallings client/server system by distributing the Pulli-Sargent system among the Stallings clients and servers, specifically placing the memory of claim 19 on a server. Such a combination would enable more useful work to be done simultaneously (Stallings, TABLE 14-2, fourth item, p.410).

52. Accordingly, in view of the foregoing, claims 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pulli in view of Sargent and further in view of Stallings.

Claim Rejections - 35 USC § 101

53. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

54. Claims 18, 21-23 and 24-25 are rejected under 35 U.S.C. 101 because a representation of an object surface, though seemingly a "manufacture," constitutes a mere arrangement of printed matter, and is therefore not within the statutory classes.

Response to Remarks

55. The examiner sees that the applicant has amended the claims based on what the examiner stated was allowable in the previous Office action. However, the examiner, in a new search, has found art that enables more claims to be rejected. Therefore, this new action is non-final.

Conclusion

Any inquiry concerning this communication or earlier communications from the Office should be directed to the examiner, Lance Sealey, whose telephone number is (703) 305-0026. He can be reached from 7:00 am-3:30 pm EST Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

Any response to this action should be mailed to:

MS Non-Fee Amendment

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or faxed to:

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Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

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